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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/370,326 08/09/99 SHOJI

*26*  
K NEC-N99-1019

MM91/0402

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EXAMINER

PAREKH, N

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 04/02/01

**Please find below and/or attached an Office communication concerning this application or proceeding.**

**Commissioner of Patents and Trademarks**

# Office Action Summary

Application No.  
09/370,326

Applicant(s)

Shoji

Examiner

Nitin Parekh

Group Art Unit  
2811



☒ Responsive to communication(s) filed on Jan 18, 1901

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 35 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

## Disposition of Claim

☒ Claim(s) 1 and 3-11 is/are pending in the applicat

Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration

☐ Claim(s) \_\_\_\_\_ is/are allowed.

☒ Claim(s) 1 and 3-11 is/are rejected.

☐ Claim(s) \_\_\_\_\_ is/are objected to.

☐ Claims \_\_\_\_\_ are subject to restriction or election requirement.

## Application Papers

☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119

☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☒ All ☐ Some\* ☒ None of the CERTIFIED copies of the priority documents have been

☒ received.

☐ received in Application No. (Series Code/Serial Number) \_\_\_\_\_

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\*Certified copies not received: \_\_\_\_\_

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

## Attachment(s)

☒ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 3 and 7

☐ Interview Summary, PTO-413

☒ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

— SEE OFFICE ACTION ON THE FOLLOWING PAGES —

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## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 3-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abbott et al (US Pat. 5777382) in view of Itoh et al (US Pat. 5912505), Beckham et al (US Pat. 4604644) and Pennisi et al (US Pat. 5128746).

Regarding claims 1 and 3, Abbott et al disclose an array of electrodes fabricated on an insulating substrate (14 in Fig. 1 and 2) having a conductive pattern/pad (16, 18, etc. in Fig. 1 and 2) on a major surface comprising:

- plural electrodes (20 in Fig. 2) fixed to the conductive pattern using conventional conductive attachment for connecting solder balls to the conductive pattern/pad ( Fig. 2; Col. 4, line 46), and
- an insulating resin/plastic layer covering a remaining portion of the surface except the top surface of the plural electrodes to anchor the plural electrodes to the insulating substrate (Fig. 1 and 2; Col. 1, line 58- Col. 3, line 68; Col. 4, line 40- Col. 5, line 3).

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Abbott et al fail to specify the conventional conductive attachment means such as a conductive paste selected from the group consisting of silver paste, gold paste, copper paste and solder paste to fix the electrodes to the conductive pattern. It is conventional in the chip interconnection and packaging art to use a variety of bonding means including solder paste, conductive powder, conductive paste, etc. for the interconnection of the electrode and conductive pattern. Itoh et al teach using a conventional solder paste (6, 7, 9, etc. in Fig. 4 and 5; Col. 3 and 4) for fixing electrodes to the conductive pattern/pad. The cited reference by Sawayama et al (Fig. 1-29; examples 1-32) teach using conductive paste/creme made from the group of metals consisting of silver, gold, platinum, copper or solder paste to form conductive interconnections between electrodes/balls such as gold, aluminum, solder, etc. and the conductive layer. Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to incorporate a conductive paste selected from the group consisting of silver paste, gold paste, copper paste and solder paste to fix the electrodes to the conductive pattern and provide an insulating resin layer covering a major surface of the substrate to improve the bonding strength and reliability using Itoh et al's teaching in Abbott et al array/package as cited in claims 1 and 3.

Regarding claim 4, Abbott et al disclose an insulating resin/plastic layer having a tapered surface/configuration but fail to specify a meniscus configuration around each of the plural electrodes. Beckham et al teach using a dielectric/insulating resin having a meniscus

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configuration/shape around the outer electrodes (Fig. 5; Col. 6, line 42) in an IC device. It is a matter of design choice to select the shape/dimension and the coverage of the insulating/encapsulating layer to achieve the desired degree of surface protection and bond strength. Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to incorporate a meniscus configuration around each of the plural electrodes to achieve the desired degree of surface protection and bond strength using Beckham et al's design in Abbott et al's array/package in view of Itoh et al as cited in claim 4.

Regarding claims 5 and 6, Abbott et al fail to specify the insulating resin/plastic layer being a thermosetting synthetic resin having a meniscus configuration formed during thermosetting and that being selected from the group consisting of polyimide resin, epoxy resin, phenol resin, acrylic resin and silicon resin. Beckham et al teach using various resin formulations such as an epoxy-based resin and polyimide resin where the meniscus configuration is formed during curing/thermosetting (Col. 6, line 43- Col. 8, line 40). Pennisi et al teach using a variety of conventional resins such as epoxy, polyester, etc. having a meniscus configuration formed during thermosetting in a solder/electrode interconnection (Fig. 2; Col. 3-6; Examples 1-5). Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to use thermosetting resin with meniscus configuration selected from the group consisting of polyimide resin, epoxy resin, phenol resin, acrylic resin and silicon resin to achieve the desired

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degree of surface protection and bond strength using Beckham et al's teaching in Abbott et al's array/package in view of Itoh et al as cited in claims 5 and 6.

Regarding claims 7-9, Abbott et al disclose the solder ball electrodes being formed on the conductive land/pad of the conductive pattern forming a part of a variety of conventional substrates such as lead frame, flex circuit/interposer, laminate circuit, etc. and the solder balls being fixed to the electrodes of a semiconductor chip (Fig. 1 and 2; Col. 4, line 20; Col. 4, line 47; Col. 2-5).

Regarding claims 10 and 11, Abbott et al disclose forming the plural electrodes made of conventional solder/heat fusible conductive material comprising solder/bits of heat-fusible conductive material, conductive pin, solder column, etc. and fixing them to the conductive pattern (Col.3, line 18; Col. 4, line 60; Col. 2-5).

Papers related to this application may be submitted directly to Art Unit 2811 by facsimile transmission. Papers should be faxed to Art Unit via Technology Center 2800 fax center located in Crystal Plaza 4, room 4C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989).

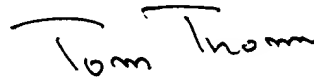
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nitin Parekh whose telephone number in (703) 305-3410. The examiner can be normally reached on Monday-Friday from 08:30 am-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas, can be reached on (703) 308-2772. The fax number for the organization where this application or proceeding is assigned is (703) 308-7722 or 7724.

Nitin Parekh

03-29-01

A handwritten signature in black ink that reads "Tom Thomas". The signature is written in a cursive, slightly stylized font.

**TOM THOMAS**  
**SUPERVISORY PATENT EXAMINER**